

Nitrate Removal from Rural Wastewater

"By recognizing the need to properly treat wastewater in non-sewered areas and acknowledging the limitations of traditional septic systems, Aquarobic has been a leader in designing and manufacturing advanced wastewater treatment systems since its inception in the early 1970s."

Daniel E. Pavon, President
Aquarobic Limited
Penetanguishene, Ontario

THE COMPANY

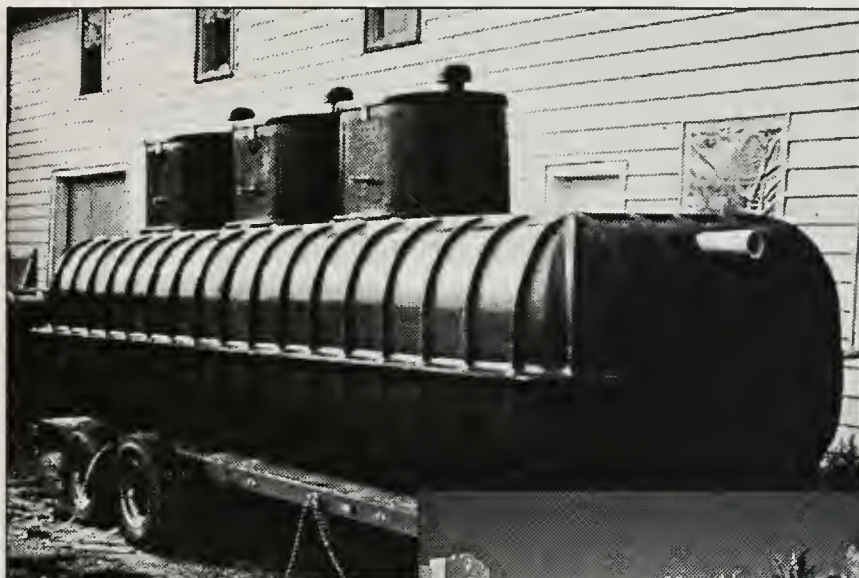
Aquarobic Limited manufactures innovative wastewater treatment systems for the North American and international markets. The company's product line has a proven track record with over 4,000 installations in Canada and 2,000 in the United States and the Caribbean. Commercial systems are sold through a network of dealers who provide installation and maintenance services.

Aquarobic systems range in size from small, single family units to systems serving communities or commercial establishments. Two main series of plants — mini-plants and maxi-plants — have been developed to meet client needs in the treatment of domestic and light industrial wastewater. Both focus on the reduction of biological oxygen demand (BOD) and suspended solids (SS).

The mini, maxi and denitrification systems have treatment capacities of 500 to 100,000 gallons per day. Systems are modular in design, allowing for ease of installation, maintenance and expansion.

CHALLENGE

As a result of ineffective rural wastewater treatment, nitrate contaminated ground water has become a major concern to environment and health authorities across North America. Regulatory authorities have



Typical Aquarobic MAXI Plant and hotel in the Caribbean utilizing an Aquarobic system



encouraged the development of nitrate removal systems by requiring septage discharges to meet drinking water standards for nitrates. As a result, Aquarobic has focused its research and development efforts in the past five years on developing an effective nitrate removal system.

TECHNOLOGY DESCRIPTION

Aquarobic's denitrification system was designed as an add-on component for mini and maxi plants. The process for removing nitrogenous compounds in wastewater involves two separate, yet interrelated bacteriological reactions which occur in add-on reactors. Aquarobic's biological, sequential batch reactor (SBR) system has captured these processes in one system.

In the first step, bacteria converts ammonia and organic nitrogen into nitrate. The second step, denitrification, involves removal of the nitrate from the wastewater.

RESULTS

Testing of this process was completed by the National Sanitation Foundation (NSF) in June, 1994. In its report, NSF concludes that the Aquarobic unit was able to achieve significant denitrification resulting in effluent nitrate levels consistently less than 4 mg/L (overall mean of 4.5 mg/L). BOD levels were generally maintained below 30 mg/L. Influent Total Kjeldahl Nitrogen (TKN) levels averaged approximately 40 mg/L, while effluent TKN plus nitrate-nitrogen concentrations averaged below 3 mg/L. In limited sampling, effluent nitrate levels were generally nondetectable and some removal of dissolved phosphate species was observed through the overall unit.

TECHNOLOGY OPPORTUNITIES

By protecting the quality of ground water, Aquarobic's denitrification systems also protects public health in areas susceptible to nitrate contamination from agricultural practices and inadequate rural seepage systems. Elevated levels of nitrates in our drinking water can cause infant cyanosis (blue discoloration of skin) and affect the fetus in a pregnant woman.

An increasing number of developed rural areas in Canada and the United States have elevated nitrate levels that exceed health objectives. Since introducing it in 1994, Aquarobic has been actively marketing its denitrification capability. The system has completed the regulatory approval process and received final certification in some jurisdictions.

PARTNERSHIP IN POLLUTION PREVENTION AND RESOURCE CONSERVATION

The demonstration of this technology was partially supported by the Ontario Ministry of the Environment.

Industrial companies located in Ontario may seek ministry/industry services which will help them:

- * reduce, reuse and recycle solid waste;
- * effectively remediate historic pollution and destroy hazardous contaminants;
- * reduce or eliminate liquid effluent and gaseous emissions;
- * use energy and water more efficiently.

Equipment and services supply companies can benefit from the information provided on technologies identified for business development.

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For information on Ministry of the Environment assistance to industry, please contact the Environmental Partnerships Branch at (416) 327-1492, Fax (416) 327-1261

For more project profiles and other publications, visit the ministry's website at <http://www.ene.gov.on.ca>

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